



Designation: B857 – 14

# Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Supported (ACSS/TW)<sup>1</sup>

This standard is issued under the fixed designation B857; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers shaped wire compact concentric-lay-stranded aluminum conductors, steel supported (ACSS/TW) for use as overhead electrical conductors (see Explanatory [Note 1](#)).

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.2.1 *Exceptions*—For conductor sizes designated by AWG or kcmil sizes, the requirements in SI units are numerically converted from the corresponding requirements in inch-pound units. For conductor sizes designated by SI units only, the requirements are stated or derived in SI units. For density, resistivity, and temperature, the values stated in SI units are to be regarded as standard.

1.3 ACSS/TW is designed to increase the aluminum area for a given diameter of conductor by the use of trapezoidal shaped wires (TW), or to reduce the diameter for a given area of aluminum. The conductors consist of a central core of round steel wire(s) surrounded by two or more layers of trapezoidal aluminum 1350-0 wires. Different strandings of the same size of conductor are identified by type, which is the approximate ratio of steel area to aluminum area expressed in percent (see [Table 1](#), [Table 2](#), and [Table 3](#)). For the purpose of this specification, the sizes listed in [Table 1](#) and [Table 2](#) are tabulated on the basis of the finished conductor having an area or outside diameter equal to that of specified sizes of standard ACSR, ACSS, and ACSR/TW so as to facilitate conductor selection.

## 2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form part of this specification to the extent referenced herein:

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.07 on Conductors of Light Metals.

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## 2.2 ASTM Standards:<sup>2</sup>

- B263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors
- B354 Terminology Relating to Uninsulated Metallic Electrical Conductors
- B498/B498M Specification for Zinc-Coated (Galvanized) Steel Core Wire for Use in Overhead Electrical Conductors
- B500/B500M Specification for Metallic Coated or Aluminum Clad Stranded Steel Core for Use in Overhead Electrical Conductors
- B502 Specification for Aluminum-Clad Steel Core Wire for Use in Overhead Electrical Aluminum Conductors
- B549 Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced for Use in Overhead Electrical Conductors
- B606 Specification for High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced
- B609/B609M Specification for Aluminum 1350 Round Wire, Annealed and Intermediate Tempers, for Electrical Purposes
- B802/B802M Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)
- B803 Specification for High-Strength Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Use in Overhead Electrical Conductors
- B856 Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported (ACSS)
- B957 Specification for Extra-High-Strength and Ultra-High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Overhead Electrical Conductors
- B958 Specification for Extra-High-Strength and Ultra-High-Strength Class A Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Use in Overhead Electrical Conductors
- E29 Practice for Using Significant Digits in Test Data to

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

**TABLE 1 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported<sup>A</sup>**

NOTE 1—Sized to have area equal aluminum cross-sectional area to an ACSR or ACSS, Class AA conductor.

ACSS/TW Conductor Size	Code Word <sup>B</sup>	Size and Stranding of ACSS with Equal Aluminum Cross-Sectional Area			Aluminum Stranding	Number of Aluminum Wires	Number of Layers	Number of Wires	Steel Core Stranding	Individual Strand Wire Diameter, in.	Nominal Mass ACSS/TW	ACSS/TW Conductor Rated Strength (by type of steel core wire)					Nominal Outside Diameter
		kcmil	Stranding	Stranding								GA2 / MA2 KIPS	GA3 / MA3 KIPS	GA4 / MA4 KIPS	GA5 / MA5 KIPS	AW2 KIPS	
kcmil <sup>C</sup>	Type																
266.8	16	Partridge/ACSS/TW	266.8	267	18	2	7	0.0788		349	8.90	9.70	10.8	11.4	8.40	8.90	0.58
336.4	23	Oriole/ACSS/TW	336.4	307	17	2	7	0.1059		526	14.8	16.3	18.2	19.1	14.2	14.8	0.69
477.0	13	Flicker/ACSS/TW	477.0	247	18	2	7	0.0940		612	13.0	14.2	15.7	16.4	12.5	13.0	0.78
477.0	16	Hawk/ACSS/TW	477.0	267	18	2	7	0.1053		655	15.6	17.1	18.9	19.8	14.9	15.6	0.79
477.0	23	Hen/ACSS/TW	477.0	307	17	2	7	0.1261		746	21.0	22.7	25.4	26.7	20.1	20.5	0.83
556.5	13	Parakeet/ACSS/TW	556.5	247	18	2	7	0.1015		714	15.2	16.6	18.3	19.1	14.6	15.2	0.84
556.5	16	Dove/ACSS/TW	556.5	267	20	2	7	0.1138		764	18.2	19.9	22.1	23.1	17.5	18.2	0.85
636.0	13	Rook/ACSS/TW	636.0	247	18	2	7	0.1085		818	17.3	19.0	20.9	21.9	16.7	17.3	0.89
636.0	16	Grosbeak/ACSS/TW	636.0	267	20	2	7	0.1216		873	20.7	22.4	24.8	26.0	19.9	20.3	0.91
795.0	7	Tern/ACSS/TW	795.0	457	17	2	7	0.0886		891	14.2	15.2	16.6	17.5	13.5	14.2	0.96
795.0	10	Puffin/ACSS/TW	795.0	227	18	2	7	0.1108		974	18.9	20.6	22.6	23.7	18.3	18.9	0.98
795.0	13	Condor/ACSS/TW	795.0	547	20	2	7	0.1213		1020	21.7	23.3	25.7	26.9	20.9	21.3	0.99
795.0	16	Drake/ACSS/TW	795.0	267	20	2	7	0.1360		1091	25.9	28.0	31.0	32.5	24.4	25.4	1.01
795.0	23	Mallard/ACSS/TW	795.0	30/19	22	2	19	0.0977		1234	34.3	37.9	42.1	44.3	32.9	34.3	1.05
954.0	5	Phoenix/ACSS/TW	954.0	427	30	3	7	0.0837		1028	14.2	15.2	16.3	17.1	13.6	14.2	1.05
954.0	7	Rail/ACSS/TW	954.0	457	32	3	7	0.0971		1074	16.7	18.0	19.6	20.4	16.2	16.7	1.06
954.0	13	Cardinal/ACSS/TW	954.0	547	20	2	7	0.1329		1227	26.0	28.0	30.9	32.3	24.6	25.5	1.08
1033.5	5	Snowbird/ACSS/TW	1033.5	427	30	3	7	0.0871		1114	15.4	16.4	17.7	18.5	14.8	15.4	1.09
1033.5	7	Oriolan/ACSS/TW	1033.5	457	32	3	7	0.1010		1163	18.1	19.5	21.2	22.0	17.6	18.1	1.10
1033.5	13	Curlew/ACSS/TW	1033.5	547	21	2	7	0.1383		1326	28.2	30.3	33.4	35.0	26.1	27.7	1.13
1113.0	5	Avocet/ACSS/TW	1113.0	427	30	3	7	0.0904		1199	16.3	17.5	18.8	19.5	15.9	16.3	1.13
1113.0	7	Bluejay/ACSS/TW	1113.0	457	33	3	7	0.1049		1253	19.5	21.0	22.9	23.8	18.9	19.5	1.14
1113.0	13	Finch/ACSS/TW	1113.0	54/19	38	3	19	0.0862		1427	30.4	33.2	36.5	38.7	28.8	30.4	1.19
1192.5	5	Oxbird/ACSS/TW	1192.5	427	30	3	7	0.0936		1285	17.5	18.7	20.2	20.9	17.0	17.5	1.17
1192.5	7	Bunting/ACSS/TW	1192.5	457	33	3	7	0.1085		1342	20.9	22.5	24.5	25.5	20.3	20.9	1.18
1192.5	13	Grackle/ACSS/TW	1192.5	54/19	38	3	19	0.0892		1529	32.6	35.5	39.1	41.5	30.8	32.6	1.22
1272.0	5	Scissortail/ACSS/TW	1272.0	427	30	3	7	0.0967		1371	18.7	20.0	21.5	22.3	18.2	18.7	1.20
1272.0	7	Blittern/ACSS/TW	1272.0	457	35	3	7	0.1121		1432	22.3	24.0	26.1	27.2	21.6	22.3	1.22
1272.0	13	Pheasant/ACSS/TW	1272.0	54/19	39	3	19	0.0921		1630	34.1	37.3	41.1	43.0	32.8	34.1	1.26
1351.5	7	Dipper/ACSS/TW	1351.5	457	35	3	7	0.1155		1521	23.7	25.5	27.7	28.8	23.0	23.7	1.26
1351.5	13	Martin/ACSS/TW	1351.5	54/19	39	3	19	0.0949		1732	36.2	39.6	43.6	45.6	34.9	36.2	1.30
1431.0	7	Bobolink/ACSS/TW	1431.0	457	36	3	7	0.1189		1611	25.1	27.0	29.4	30.5	24.3	25.1	1.29
1431.0	13	Plover/ACSS/TW	1431.0	54/19	39	3	19	0.0977		1834	38.4	41.9	46.2	48.3	36.9	38.4	1.34
1590.0	7	Lapwing/ACSS/TW	1590.0	457	36	3	7	0.1253		1790	27.9	29.6	32.2	33.5	27.0	27.5	1.36
1590.0	13	Falcon/ACSS/TW	1590.0	54/19	42	3	19	0.1030		2038	42.6	46.6	51.3	53.7	41.1	42.6	1.41
1780.0	8	Chukar/ACSS/TW	1780.0	84/19	37	3	19	0.0874		2061	35.3	38.2	41.6	43.9	33.6	35.3	1.45
2156.0	8	Bluebird/ACSS/TW	2156.0	84/19	64	4	19	0.0961		2512	42.1	45.5	49.6	51.7	40.7	42.1	1.61

<sup>A</sup> Conversion factors:

1 cmil = 5.067E-04 mm<sup>2</sup> (0.0005067 mm<sup>2</sup>)

1 in. = 2.54E+01 mm (25.4 mm)

1 lb/1000ft = 1.488 kg/km

1 ft = 3.048E-01 m (0.3048 m)

1 lb = 4.536E-01 kg (0.4536 kg)

1 lbf = 4.448E-03 kN (0.0044448 kN)

<sup>B</sup> Code Words shown in this column are obtained from "Publication 50, Code Words for Overhead Aluminum Electrical Conductors," by the Aluminum Association. They are provided for information only.

<sup>C</sup> See Explanatory Note 4.

**TABLE 2 Construction Requirements for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated Steel Supported<sup>A</sup>**

NOTE 1—Sized to have a diameter equal to a concentric round ACSR or ACSS, Class AA conductor.

ACSS/TW Conductor Size	Code Word <sup>B</sup>	Size and Stranding of ACSS with Equal Overall Conductor Diameter	Aluminum Stranding	Steel Core Stranding	Nominal Mass ACSS/TW	ACSS/TW Conductor Rated Strength (by type of steel core wire)					Nominal Outside Diameter			
						GA2/MA2 KIPS	GA3/MA3 KIPS	GA4 / MA4 KIPS	GA5 / MA5 KIPS	AW2 KIPS		AW3 KIPS		
kcmil <sup>C</sup>	Type	kcmil Stranding	Number of Aluminum Wires	Number of Wires	Individual Strand Wire Diameter, in.	GAX Core lb/1000 ft	GA2/MA2 KIPS	GA3/MA3 KIPS	GA4 / MA4 KIPS	GA5 / MA5 KIPS	AW2 KIPS	AW3 KIPS	in.	
571.7	13	Mohawk/ACSS/TW	18	2	24/7	477.0	18	17.1	18.8	19.7	15.0	15.6	15.6	0.85
565.3	16	Calumet/ACSS/TW	20	2	26/7	477.0	20	20.2	22.4	23.5	17.7	18.4	18.4	0.86
666.6	13	Mythic/ACSS/TW	20	2	24/7	556.5	20	19.9	21.9	22.9	17.5	18.2	18.2	0.91
664.8	16	Oswego/ACSS/TW	20	2	26/7	556.5	20	23.4	26.0	27.2	20.9	21.3	21.3	0.93
768.2	13	Maumee/ACSS/TW	20	2	24/7	636.0	20	21.0	25.3	26.5	20.2	21.0	21.0	0.98
762.8	16	Wabash/ACSS/TW	20	2	26/7	636.0	20	26.8	29.7	31.2	23.4	24.4	24.4	0.99
957.2	7	Kettler/ACSS/TW	32	3	45/7	795.0	32	10.78	19.7	20.4	16.3	16.8	16.8	1.06
946.7	10	Fraser/ACSS/TW	35	3	22/7	795.0	35	11.40	21.1	26.2	20.3	21.1	21.1	1.08
966.2	13	Columbia/ACSS/TW	21	2	54/7	795.0	21	22.9	31.3	32.8	24.9	25.9	25.9	1.09
959.6	16	Suwannee/ACSS/TW	22	2	26/7	795.0	22	30.7	36.8	38.6	28.2	30.0	30.0	1.11
1080.0	7	...	20	2	45/7	900.0	20	12.11	22.2	23.1	18.4	18.9	18.9	1.13
1168.1	5	Cheyenne/ACSS/TW	30	3	42/7	954.0	30	10.926	19.7	20.4	16.7	17.1	17.1	1.16
1158.0	7	Genesee/ACSS/TW	33	3	45/7	954.0	33	13.07	24.0	25.0	19.9	20.5	20.5	1.17
1158.4	13	Hudson/ACSS/TW	25	2	54/7	954.0	25	14.67	37.0	38.8	28.7	30.5	30.5	1.20
1272.0	5	Catawba/ACSS/TW	30	3	42/7	1033.5	30	13.71	21.5	22.3	18.2	18.7	18.7	1.20
1257.1	7	Nelson/ACSS/TW	35	3	45/7	1033.5	35	14.16	25.8	26.9	21.4	22.1	22.1	1.21
1233.6	13	Yukon/ACSS/TW	38	3	54/7	1033.5	38	15.84	40.0	41.9	32.0	33.2	33.2	1.25
1372.5	5	Truckee/ACSS/TW	30	3	42/7	1113.0	30	14.79	23.2	24.0	19.6	20.2	20.2	1.25
1359.7	7	Mackenzie/ACSS/TW	36	3	45/7	1113.0	36	15.31	27.9	29.0	23.1	23.8	23.8	1.26
1334.6	13	Thames/ACSS/TW	39	3	54/19	1113.0	39	17.11	43.1	45.1	34.5	35.8	35.8	1.29
1467.8	5	St. Croix/ACSS/TW	33	3	42/7	1192.5	33	15.83	24.9	25.8	21.0	21.6	21.6	1.29
1455.3	7	Miramichi/ACSS/TW	36	3	45/7	1192.5	36	16.39	29.5	30.7	24.8	25.2	25.2	1.30
1433.6	13	Merrimack/ACSS/TW	39	3	54/19	1192.5	39	18.38	46.3	48.4	37.0	38.4	38.4	1.34
1569.0	5	Platte/ACSS/TW	33	3	42/7	1272.0	33	16.91	24.6	27.5	22.4	23.1	23.1	1.33
1557.4	7	Potomac/ACSS/TW	36	3	45/7	1272.0	36	17.54	31.6	32.8	26.5	26.9	26.9	1.35
1533.3	13	Rio Grande/ACSS/TW	39	3	54/19	1272.0	39	19.66	49.6	51.9	39.6	41.2	41.2	1.38
1657.4	7	Schuykill/ACSS/TW	36	3	45/7	1351.5	36	18.66	29.1	30.9	28.2	28.6	28.6	1.39
1622.0	13	Pecos/ACSS/TW	39	3	54/19	1351.5	39	21.05	54.3	56.9	43.3	45.0	45.0	1.42
1758.6	7	Pee Dee/ACSS/TW	37	3	45/7	1431.0	37	19.80	35.7	37.1	29.4	30.4	30.4	1.43
1730.6	13	James/ACSS/TW	39	3	54/19	1431.0	39	22.19	55.9	58.5	44.7	46.4	46.4	1.47
1949.6	7	Athabaska/ACSS/TW	42	3	45/7	1590.0	42	11.392	39.3	40.8	31.7	33.5	33.5	1.50
1926.9	13	Cumberland/ACSS/TW	42	3	54/19	1590.0	42	11.33	62.2	65.0	49.7	51.6	51.6	1.55
2153.8	8	Powder/ACSS/TW	64	4	84/19	1780.0	64	10.961	45.5	51.7	40.7	42.1	42.1	1.60
2627.3	8	Santee/ACSS/TW	64	4	84/19	2156.0	64	10.62	60.6	63.1	49.7	51.3	51.3	1.76

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- 1 in. = 2.54E+01 mm (25.4 mm)
- 1 lb/1000 ft = 1.488 kg/km
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<sup>C</sup> See Explanatory Note 4.